

CA

7

Detection of small quantities of bismuth in the presence of lead. A. I. Busev (Far Eastern Polytech. Inst., Vladivostok). *Zhur. Anal. Khim.* 5, 255-6(1950).-- This method is based on the reduction of Pb by CH_3O in an alk. soln. in the presence of a little Bi. To 2-3 ml. of soln. add 1 ml. of 2 N $\text{Pb}(\text{NO}_3)_2$ (if the soln. does not contain Pb), 2 ml. of 10% CH_3O , and 1 ml. of 50% NaOH . In another test tube, take the same vol. of $\text{Pb}(\text{NO}_3)_2$, CH_3O , and NaOH solns. If the tested soln. contains Bi, a gray or black (depending on the quantity of Bi) ppt. will appear in the 1st test tube within 1-2 min. at room temp. The min. quantity of Bi detectable by this method is 0.1 mg. Small quantities of Mn, Sb, and Fe do not interfere. Ag, Cu, and much Fe interfere. In the presence of much Sn, NaOH should be used sparingly. Heating of the tested soln. should be avoided since Pb will be gradually reduced by CH_3O . The CH_3O should be free of impurities which will give a brownish discoloration with NaOH on standing or heating. M. Hosh

C.A.

Reduction of trivalent bismuth by solutions of salts of
bivalent chromium. A. I. Busy, (Far Eastern Polytech.
Inst., Vladivostok). *Doklady Akad. Nauk S.S.S.R.* 74,
55-6 (1960).--In the potentiometric titration, at room
temp., of a soln. of BiCl_3 by a soln. of CrSO_4 or CrCl_2 in a
 CO_2 atm., on a Pt electrode, there is a sharp potential
jump by 100-400 mv. at the point corresponding to $\text{Bi}^{3+} +$
 $3 \text{Cr}^{2+} = \text{Bi} + 3 \text{Cr}^{3+}$. The reaction is strictly stoi-
chiometric and practically instantaneous. The mag-
nitude of the potential jump decreases somewhat with in-
creasing concn. of free HCl , above 0.1 M. Chlorides and
sulfates of alkali metals at concns. 0.1-2 M have no notice-
able effect.

ANISIMOV, N.S., redaktor; ~~BUSHEV, A.I.~~, redaktor; DANYUSHEVSKAYA, A.I.,
redaktor; OZHIGOV, Ye.P., redaktor; SAMODELKIN, A.P., redaktor;
GONCHAR, G.V., tekhnicheskiy redaktor

[Reports on scientific research projects by the members of the
Maritime Division of the D.I.Mendeleev All-Union Chemical Society]
Soobshcheniia o nauchno-issledovatel'skikh rabotakh chlenov Primor-
skogo otdeleniia Vsesoiuznogo khimicheskogo obshchestva imeni D.I.
Mendeleeva. Vladivostok. No.1. 1951 81 p. (MIRA 8:3)

1. Akademiya nauk SSSR. Dal'nevostochnyy filial, Vladivostok.
(Chemistry--Research)

BUSEV, A.I.

Current state of bismuth and mercury separation. Soob. Prim. otd.
VKHO no.1:3-13 '51. (MIRA 11:2)
(Bismuth) (Mercury)

CR

Potentiometric determination of bismuth with a solution of bivalent chromium. A. I. Buzga, *Zhur. Anal. Khim.* 6, 178 85(1971); cf. C.A. 45, 406. Potentiometric titration of Bi is based on the reaction: $\text{Bi}^{3+} + 3\text{Cr}^{2+} = \text{Bi} + 3\text{Cr}^{3+}$. The titration can be carried out in the presence of 0.1-6 moles/l. of HCl. The reduction of Bi will take place even at considerably higher concns. of HCl but the potential jump will not be as clear. The titration is carried out preferably under CO_2 . By this method Bi can be detd. in the presence of Pb and Cd. M. Huseh

BUSEV, A. I.

Chem Abs V48

1 - 25-54

analytical Chemistry

3

① Chem

Present state of colorimetric and nephelometric methods
for the determination of bismuth. A. I. Busev. *Uspekhi*
Khim. 21, 1502-17(1052).—Review with 108 references.
G. M. Krasolant

MF
5-6-54

BUSEV, A.I.

[Analytic chemistry of bismuth] Analiticheskaia khimiia vismuta.
Moskva, Izd-vo Akademii nauk SSSR, 1953. 380 p. (MLRA 6:12)
(Bismuth)

BUSEV, A.I.

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
Analytical Chemistry

Direct bromometric titration of bismuth, iron, copper, and other hydroxyquinolates. A. I. Busev (Far Eastern Polytech. Inst., Vladivostok). *Zhur. Anal. Khim.* 8, 299-301 (1953). For direct titration of 8-hydroxyquinolates a set-up is suggested comprising a flask carrying a calomel electrode and a beaker where the hydroxyquinolate is dissolved in HCl. The flask and the beaker are joined through a salt bridge. The calomel electrode is connected to the neg. and the Pt to the pos. terminal of a millivoltmeter. The calomel electrode is connected through a resistance so chosen that one drop of $KBrO_3$ causes a deflection of 20-30 divisions on the millivoltmeter. To the quinolate soln. contg. approx. 20% of HCl add 1 g. of KBr and titrate with 0.1N $KBrO_3$ until the deflection on the millivoltmeter remains 2-3 min. Fe^{3+} , Cu^{2+} , Bi^{3+} and other cations do not interfere. M. Hosh

7-13-54

BUSEV, Aleksey Ivanovich, doktor khimicheskikh nauk; KIPNIS, S.Ye.,
redaktor; ISLENT'YEVA, P.G., tekhnicheskiiy redaktor.

[Some methods of analytical chemistry] O nekotorykh metodakh
analiticheskoi khimii. Moskva, Izd-vo "Znanie," 1955. 37 p.
(Vsesoiuznoe obshchestvo po rasprostraneniuiu politicheskikh
i nauchnykh znanii. Ser.3, no.38) (MLRA 8:11)
(Chemistry, Analytical)

BUSEV, A.I., POLYANSKIY, N.G.

~~ANALYSIS OF METALS~~

"Analysis of metals" [in German]. O. Proske, H. Blumenthal, F.
Esselin, eds. Reviewed by A.I. Busev, N.G. Polianskii. Zhur.
anal.khim. 10 no.6:384 M-D '55. (MIRA 9:3)

(Metals--Analysis)

ALIMARIN, I.P., professor, otvetstvennyy redaktor; ~~BUSEV, A.I., doktor~~
khimicheskikh nauk, otvetstvennyy redaktor; MULIN, Ye.V., tekhnicheskiiy redaktor

[Methods of analyzing rare and nonferrous metals] Metody analiza redkikh i tsvetnykh metallov. [Moskva] 1956. 174 p. (MIRA 10:1)

1. Moscow. Universitet. Kafedra anliticheskoy khimii 2. Chlen-korrespondent Akademii nauk SSSR (for Alimarin).
(Metals--Analysis)

BUSEV, Aleksey Ivanovich; ZVYAGINTSEV, O.Ye., professor, doktor khimicheskikh nauk, otvetstvennyy redaktor; SHEVCHENKO, G.N., tekhnicheskii redaktor

[Analytical chemistry; literature in Russian (1941-1952)] Analiticheskaya khimiya; literatura na russkom iazyke (1941-1952gg). Moskva, Izd-vo Akademii nauk SSSR, 1956. 403 p. (MLRA 9:7)
(Bibliography--Chemistry, Analytical)

BUSEV, A.I.; POLYANSKIY, N.G.

"Electrometric pH determinations. Theory and practice." Roger G. Bates. Reviewed by A.I. Busev, N.G. Polianskii. Zhur.anal.khim. 11 no.2:252-253 Mr-Apr '56. (MLBA 9:8)
(Hydrogen-ion concentration) (Bates, Roger G.)

RUSEV, P. I.

2086. Dialkyl and diaryl phosphorodithiosts
as analytical reagents. I. Potentiometric deter-
mination of copper by means of nickel diethyl
dithiophosphate

As is well known, the determination of copper by means of nickel diethyl dithiophosphate is a very sensitive method. It is used for the determination of copper in alloys, ores, and other materials. The method is based on the reaction of copper with nickel diethyl dithiophosphate to form a complex. The complex is then titrated with a standard solution of nickel diethyl dithiophosphate. The endpoint of the titration is indicated by a change in the potential of the electrode.

A further test of the method is the determination of copper in brass. The method is very accurate and reliable. It is used for the determination of copper in brass of various compositions.

titration of CuSO_4 is carried out with a secondary indicator electrode. Interference of Fe^{3+} is prevented by addition of H_2O_2 and that of Sn^{2+} by oxidation to Sn^{4+} . To determine Cu in brass and other copper alloys, the material is dissolved in HCl , H_2O_2 , and H_2SO_4 oxide of N are removed if HNO_3 has been used, and the solution is titrated with the nickel salt of I. The solution must be free of any SnO_2 that may be there. With a sample containing Pb, the Pb is first removed as PbSO_4 . Brass containing 59.54% of Cu gave a result of 59.54%, and beryllium bronze with 97.26% gave a result of 97.26%. A sulphide ore containing 2.80% gave a result of 2.78% of Cu.

G. S. SMITH

in DM

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CIA-RDP86-00513R000307710016-6

Busey, H.L.

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CIA-RDP86-00513R000307710016-6"

BUSEV, A.I.

BUSEV, A.I.; POLYANSKIY, N.G.

Experimental laboratory methods. ("Laboratory extraction methods"
[in German] by Erich Hecker. Reviewed by A.I. Busev and N.G. Po-
lyanskiy). Zhur. anal. khim. 11 no.6:758-760 N-D '56. (MLRA 10:6)
(Extraction (Chemistry))
(Hecker, Erich)

BUSEV, A.I.

USSR / Analytical Chemistry. General Problems.

E-1

Abs Jour: Ref. Zhur - Khimiya No. 2, 1958, 4261

Author : Busev, A.I., Ivanyutin, M.I., Turchinsky, M.F.

Inst : Moscow University

Title : Dialkyl- and Diaryldithiophosphoric Acids As Analytical Reagents. Information 2. About Diphenyldithiophosphoric Acid and Some of Its Salts.

Orig Pub: Vestnik Mosc. un-ta. ser. matem., mechan., astron., fis., khimi, 1957, No 2, 177-182

Abstract: The synthesis of diphenyldithiophosphoric acid $(C_6H_5O)_2PSSH$ from phenol and P_2S_5 was developed. The properties of this acid are described in more detail. The following compounds have been

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USSR / Analytical Chemistry. General Problems.

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Abs Jour: Ref. Zhur - Khimiya No. 2, 1958, 4261

synthesized:

$(C_6H_5O)_2PSSH \cdot C_5H_5N$ (Melting Point 96°);

$\angle (C_6H_5O)_2PSS \angle Cd$ (Melting Point 132°);

$\angle (C_6H_5O)_2PSS \angle_2 Ni$ (Melting Point 130°);

$\angle (C_6H_5O)_2PSS \angle_2 \angle Ni(C_6H_5N)_2 \angle$ (Melting Point 180°);

$\angle (C_6H_5O)_2PSS \angle_2 \angle Cd(C_6H_5N)_2 \angle$ (Melting Point $146^\circ - 150^\circ$ with the splitting off of C_5H_5N);

$(C_6H_5O)_2PSS_2 \angle Zn(C_5H_5N)_2 \angle$ (Melting Point 126°);

$\angle (C_6H_5O)_2PSS \angle_2 \angle Cd(C_6H_5N)_2 \angle$ (Melting Point 121°).

In comparing the properties of the above mentioned compounds an assumption was made as to

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USSR / Analytical Chemistry. General Problems.

E-1

Abs Jour: Ref. Zhur - Khimiya No. 2, 1958, 4261

the existence of stable inner complex compounds
consisting of four membered ring systems. See
report I RzhKhim, 1957, 23395.

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15
5-4E3A
1-4E2C

457. Analytical use of certain dyestuffs containing hydroxyl groups. I. New highly sensitive and selective reactions for antimony. A. I. Chelozov and A. I. Busev (Astrakhan Tech. Inst. of Fish Industry and Economy). *Zh. Anal. Khim.*, 1957, 12 (2), 268-270.—In acid soln. of Sb^{III} a 2% soln. of gallein in acetone gives a violet colour which is sensitive to 0.005 µg of Sb (limiting dilution 1 in 5 × 10³). No interference is caused by 100-fold amounts of alkali and alkaline-earth metals, Mg, Zn, Cd, Hg^I, Hg^{II}, Pb, Al, Fe, Cr^{III}, Cu, Ni, Mn, Co, UO₂²⁺, Th or Bi, or by 100-fold amounts of Sn^{II} and Sn^{IV}. The reaction can be used for the photometric determination of Sb and Bi in the presence of Pb. With haematoxylin in acetone soln. on filter-paper, followed by a soln. of Sb^{III} and acetone and then, after drying, by 0.5 N HCl, a blue or violet spot on a red background is obtained. The minimum amount of Sb detectable is 0.03 µg (limiting dilution 1 in 5 × 10³). Other ions behave as with gallein. G. S. SMITH

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BUSEV, A. I.

BUSEV, A.I.

Compleximetric titration of bismuth with 1-(2-pyridilazo)-2-naphthol as indicator [with summary in English]. Zhur.anal.khim. 12 no.3:386-387 Ny-Je '57. (MLRA 10:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Bismuth) (Titration)

BUSEV, A.I.; KOVALENKO, P.N.

Conditions for separation by electrolysis of bismuth from cobalt and polarographic determination of the latter. Vest. Mosk. un. Ser. mat., mekh., astron., fiz. khim., 12 no.5:151-156 '57. (MIRA 11:9)

1. Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta.

(Copper) (Photometry)

BUSEV, A.I.; IVANYUTIN, M.I.

~~Alkyl- and diarylphosphoric acids as analytic reagents.~~ Vest. Mosk.
un. Ser. mat., mekh., astron., fiz. khim., 12 no.5:157-161 '57.
(MIRA 11:9)

1. Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo
universiteta.

(Copper) (Photometry)

BUSEV, A.I.; KISELEVA, L.V.

Purifying barium sulfate by reprecipitation. Vest. Mosk. un. Ser.
mat., mekh., astron., fiz. khim., 12 no.5:227-228 '57. (MIRA 11:9)

1. Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta.
(Barium sulfate) (Precipitation)

BUSEV, Aleksey Ivanovich; POLYANSKIY, Nikolay Georgiyevich; LEVI, T.G., red.
izd-va; RYLINA, Yu.V., tekhn. red.

[Use of organic reagents in the inorganic analysis] Primenenie
organicheskikh reaktivov v neorganicheskom analize. Moskva,
Izd-vo Akad. nauk SSSR, 1958. 82 p. (Itogi nauki: Khimicheskie
nauki, no.1) (MIRA 12:1)

(Chemistry, Analytical--Quantitative)

(Chemical tests and reagents)

BUSEV, N. I.

PHASE I BOOK EXPLOITATION 727

Busev, Aleksey Ivanovich

Analiticheskaya khimiya indiya (Analytical Chemistry of Indium)
Moscow, Izd-vo AN SSSR, 1958. 242 p. 3,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut geokhimii i
analiticheskoy khimii. Komissiya po analiticheskoy khimii.

Resp. Ed.: Vinogradov, A.P., Academician; Ed. of Publishing
House: Levi, T.G.; Tech. Ed.: Simkina, Ye. N.

PURPOSE: The book is intended for analytical chemists of
scientific-research and industrial laboratories.

COVERAGE: A survey is given of all known methods for detection,
separation and determination of indium as well as of special
methods of determining indium in industrial samples and in

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Analytical Chemistry of Indium 727

raw material. Advantages, shortcomings and limitations of many of the above methods are mentioned, and the most reliable methods are described in detail. The material presented is based on Soviet and non-Soviet literature up to 1957. The author expresses his thanks to B.N. Ivanov-Emin and Yu. A. Chernikov for their critical remarks, and to V.G. Tiptsova for checking the bibliography. There are 476 references of which 122 are Soviet, 158 English, 128 German, 28 French, 18 Japanese, 11 Italian, and 11 Scandinavian, Argentinian, etc.

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AVAILABLE: Library of Congress

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BUSEV, A.I.

5(2); 21(5) PHASE I BOOK EXPLOITATION 30V/1900
Akademiya nauk SSSR. Komissiya po analiticheskoj khimii
Primeneniye radioaktivnykh izotopov v analiticheskoy khimii
(Use of Radioactive Isotopes in Analytical Chemistry) Moscow
Izd-vo AN SSSR, 1958. 366 p. [Series: Itz. Trudy, t. 9 (12)]
Krivata slip inserted. 3,000 copies printed.

Resp. Ed.: I.P. Alimarin, Corresponding Member, USSR Academy
of Sciences; Ed. of Publishing House: A.M. Yermakov, Tech.
Ed.: T.V. Polyakova.

PURPOSE: The book is intended for chemists and chemical
engineers concerned with work in analytical chemistry.
CONTENTS: The book is a collection of the principal papers
presented in Moscow at the Second Conference on the Use of
Radioactive Isotopes. The problems discussed at the
Conference included coprecipitation, aging, and solubility
of precipitates, determination of the instability constants

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of complex compounds, separation of rare earth metals, and
ion-exchange chromatography. 40 personal files mentioned.
There are 39 references, 175 of which are cited. 33 German,
19 French, 8 Swedish, 2 Hungarian, and 2 Czech.

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Busev, A.I., and V.M. Byr'ko. Radiometric Titration of Barium, Cadmium, and Zinc with Sodium Salt of 1-Phthalocarbonyl-5-Methylpyrazoline	200

AUTHORS: Ivanyutin, M. I., Busev, A. I. SOV/156-58-1-18/46

TITLE: The Determination of Bismuth by Means of Gravimetical, Titrimetical, and Photometrical Methods (Opredeleniye vismuta gravimetricheskim, titrimetricheskim i fotometricheskim metodami)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 1, pp. 73 - 78 (USSR)

ABSTRACT: The authors mentioned already earlier that bismuth may be separated quantitatively from acid solutions by means of diethyl-dithiophosphoric acid. On the basis of this reaction various determination methods of bismuth can be worked out. The greenish-yellow precipitation which is formed has a melting point at 55° and a stable composition. The determination method of the composition of the bismuth diethyl-dithiophosphate and its solubility is given. In order to determine bismuth gravimetrically, the precipitation of the bismuth diethyl-dithiophosphate which is to a small extent soluble is slightly filtered off and rinsed. Bismuth is precipitated from a weak nitric or sulfuric acid solution by an 1,2 - 1,5 fold excess of nickel diethyl-dithiophosphate solution. After filtering off of the precipitation by a glass filter Nr 2 or 3 and

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The Determination of Bismuth by Means of Gravimetric, Titrimetric, and Photometric Methods

SOV, 156-58-1-18/46

rinsing the dried product yields satisfying weight results (Table 1). Bismuth may be determined titrimetrically by visual titration by means of nickel diethyl-dithiophosphate. In the case of energetical shaking the bismuth diethyl-dithiophosphate forms nodules, the mother solution becomes clear, and the final product of the titration may therefore be easily determined. The results are given in table 2. It is convenient to titrate bismuth with nickel diethyl-dithiophosphate in the presence of thio-urea. Bismuth is separated from the solution quantitatively and the yellow precipitation together with the solution exhibits a tinge of green at the point of equivalence. Most elements of the Ist - Vth analytical groups do not disturb the bismuth determination. In contrast to this high ion concentrations (Ni^{2+} , Co^{2+} , Cr^{3+}) as well as chlorides are disturbing. Small quantities of antimony do not disturb. Table 3 gives titration results of bismuth (concentration 0,02 - 0,002 mol/l). Bismuth may be titrated potentiometrically with a platinum indicator electrode covered with mercury. There is a clear change in potential in the point of equivalence (Table 4). A highly sensitive photometric

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bismuth determination is possible in the ultraviolet range at 330mp. Disturbances which are caused by the great number of elements which form the extractible diethyl-dithiophosphates are possible here (Fig 2). The measurement of the absorption of bismuth diethyl-dithiophosphate solution makes possible the determination of 0,05 - 0,3 mg Bi in pure solutions or in the case of absence of the above mentioned elements (Fig 5). The described determination methods worked out by the authors offer great advantages compared to those used hitherto (Ref 2). Finally the determination of bismuth, copper, and lead in the burnt dust of the processing works is described. There are 3 figures, 5 tables, and 2 references, both of which are Soviet.

ASSOCIATION: Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M.V. Lomonosova (Chair of Analytical Chemistry of the Moscow State University imeni M.V. Lomonosov)

SUBMITTED: September 30, 1957
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The Determination of Bismuth by Means of Gravi-
metrical, Titrimetrical, and Photometrical Methods

SOV, 156 58-1-18/46

Card 4/4

AUTHORS: Busev, A. I., Kovalenko, P. N. SOV 156-58-1-19/46

TITLE: The Polarography of Indium on a Magnesium-, Calcium-, and Zinc-Chloride Base (Polyarografirovaniye indiya na fone khloridov magniya, kal'tsiya i tsinka)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 1, pp. 79 - 82 (USSR)

ABSTRACT: Zinc refinery waste in which the indium content does not surpass 0,1% is one of the sources of indium production. Therefore an accurate and reliable determination method of indium traces in the case of which the main components of the mentioned waste have not to be separated is very desirable. A survey of the methods used is given, their shortcomings are mentioned as well (Refs 1-3). One of the quickest methods is the polarographic method. In the case of very small indium quantities the authors used the method of wet cementation for the purpose of concentration and separation of not noble metals. The indium reduced to metal by means of zinc excess (in a diluted sulfuric acid solution) is solved together with zinc and then is investigated polarographically on the base of the zinc salt. The detection of optimum conditions of a

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The Polarography of Indium on a Magnesium-, Calcium-, and Zinc-Chloride Base SOV.156-58-1-13/46

quantitative indium determination on a base of strong electrolytes (second group of the Mendeleev system) represents the subject of the present paper. For the investigation of the behaviour of the indium ions on a dropping-mercury electrode, the visual polarograph M-7 (dating from 1946) of the Gor'kiy University Scientific Research Institute (NII Gor'kovskogo universiteta) was used. Furthermore the authors used the mirror galvanometer of the Institut fizicheskogo priborostroeniya LGU (Institute of Physical Instruments and Equipment of the Leningrad State University). In order to find the determinability of indium in various media the influence of the concentrations of the electrolytes mentioned in the title and the pH-values of the solution were investigated. The results for magnesium chloride are shown in figures 1 and 2. Table 1 shows the results with respect to CaCl_2 . The working out of the polarographic investigation of indium on the base of the zinc-electrolyte which often contains indium as admixture (Ref 5) is very important. Table 2 shows the results. The obtained results make possible the following conclusions:

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The Polarography of Indium on a Magnesium-, Calcium-, and Zinc-Chloride Base SOV/156 58-1-19/46

1) The possibility of using concentrated solutions of magnesium-, calcium-, and zinc-chloride as base for the polarographic determination of small indium quantities (order of magnitude 10^{-4} - 10^{-3} mol/l) was proved. 2) The potential of the half wave for indium is shifted to the negative side with rising concentration and the pH-value of all investigated salt base solutions. 3) In all cases the irreversibility of the electrolytical indium reduction was observed. The case of the indium polarographic investigation on a base of 0,2 M-solution of calcium chloride (pH 1,70) is an exception. There are 2 figures, 2 tables, and 5 references, 4 of which are Soviet.

ASSOCIATION: Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M.V.Lomonosova (Chair of Analytical Chemistry of the Moscow State University imeni M.V. Lomonosov)

SUBMITTED: October 15, 1957
Card 3/4

The Polarography of Indium on a Magnesium-, Calcium-, SOV/156 58-1-19/46
and Zinc-Chloride Base

Card 4/4

5(1)
AUTHORS: Busev, A.I., Ivanyutin, M.I. SOV/55-58-2-23/35
TITLE: Photometric Determination of Microquantities of Copper in Water, Ground and Biomaterials With the Aid of the Diethyldithiophosphate of Nickel (Fotometricheskoye opredeleniye mikrokolichestv medi v vodakh, pochvakh i biomaterialakh s pomoshch'yu dietilditiofosfata nikelya)
PERIODICAL: Vestnik Moskovskogo Universiteta, Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1958, Nr 2, pp 177-182 (USSR)
ABSTRACT: It is stated that the ditiophosphates are selective, highly sensitive and convenient reagents for photometric determination of small quantities of copper in many materials. The authors propose a method for the proof of copper in water, ground and several cereals. There are 8 references, 5 of which are Soviet, 2 German, and 1 American.
ASSOCIATION: Kafedra analiticheskoy khimii (Chair of Analytic Chemistry)
SUBMITTED: April 15, 1957

Card 1/1

AUTHORS:

Kost, A. N., Busev, A. I.,
Grandberg, I. I., Byr'ko, V. M.

SOV/156-58-2-37/48

TITLE:

The Dithiocarbamates of the Pyrazoline Series (Ditiokarbamaty pirazolinovogo ryada) Their Synthesis and Investigation as Analytic Reagents (Sintez i izucheniye ikh kak analiticheskikh reagentov)

PERIODICAL:

Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1958, Nr 2, pp. 349 - 353 (USSR)

ABSTRACT:

The first mentioned salts are widely used in analytic chemistry (Refs 1-3). The acids from pyrrolidine and piperidine synthesized are stable in acid media and in the case of heating and have a somewhat higher selectivity than others. The comparatively simple new production methods of the pyrazolines (Refs 4-7) enabled the authors to carry out the synthesis of the dithio-carbamic acids of the pyrazoline series (1-dithio-carboxy-pyrazoline). These acids were isolated as sodium salts. They crystallize well, are stable in dry state and well soluble in water as well as in alcohol. The aqueous solutions of these salts give an alkaline reaction; in

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The Dithiocarbamates of the Pyrazoline Series. Their
Synthesis and Investigation as Analytic Reagents

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the case of an acidification, however, a decomposition takes place, since the corresponding dithio carbamic acids are not stable. A new method due to Fedoseyev (Ref 9) was used here, since an elementary analysis of the sodium salts by means of usual methods does not yield good results (e.g. Ref 8). The products of the ethylation of cyanogen have a distinct melting temperature and may therefore serve for the identification of the substances. 10 (I - X) compounds were synthesized and investigated as analytic reagents. Absorption spectra taken for the sodium salts and the stability in aqueous solutions were investigated. The solubility of some cadmium derivatives was determined by means of the method of tracer atoms. It was proved that pyrazoline dithio-carbamates separate certain groups of metal cations at different pH-values. There are 2 figures, 1 table, and 13 references, 9 of which are Soviet.

Card 2/3

The Dithiocarbamates of the Pyrazoline Series. Their
Synthesis and Investigation as Analytic Reagents

SOV/156-58-2-37/48

ASSOCIATION: Kafedry organicheskoy i analiticheskoy khimii Moskovskogo
gosudarstvennogo universiteta im.M.V.Lomonosova (Chair
of Organic and Analytical Chemistry of the Moscow State
University imeni M.V.Lomonosov)

SUBMITTED: November 29, 1957

Card 3/3

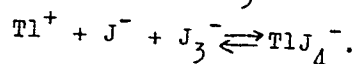
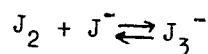
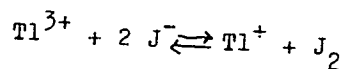
AUTHORS: Busev, A. I., Tiptsova, V. G.

SOV/156-58-3-20/52

TITLE: The Ionic Interaction of Trivalent Thallium and Iodide. The Thallium Iodide Complexes (O vzaimodeystvii ionov trekhvalentnogo talliya i iodida i ob iodidnykh kompleksakh talliya)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp. 486 - 490 (USSR)

ABSTRACT: The reaction between the trivalent thallium ion and iodide ion was investigated. On the addition of weakly acid solutions of $Tl_2(SO_4)_3$ to iodide solutions the following reactions occur:



Thallium is determined titrimetrically according to the first reaction. A selective titrimetric method for the determination of small amounts of thallium (0,2 - 2,0 mg) with potassium iodide solution was worked out. The determination is not

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The Ionic Interaction of Trivalent Thallium and Iodide. SOV/156-58-3-20/52
The Thallium Iodide Complexes

influenced by a great number of elements. The cadmium and mercury ions influence the titration as they also form complexes with iodine. The absorption spectrum of the following molar solutions was taken for the determination of the thallium complexes with iodine: $Tl : J = 1 : 2$ and $Tl : J = 1 : 3$. The maximum for the complex TlJ_4^- is at 395 mμ. The absorption maximum remains constant⁴ when more iodide is added. There are 4 figures, 2 tables, and 5 references, 1 of which is Soviet.

ASSOCIATION: *Kafedra* analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta im.M.V.Lomonosova (Chair of Analytical Chemistry at Moscow State University imeni M.V. Lomonosov)

SUBMITTED: December 27, 1957

Card 2/2

5(2),5(3)

AUTHORS: Busev, A. I., and Kiseleva, L. V.

00V/51-58-(-12/11

TITLE: 1-(2-Pyridylazo)-2-Naphthol as a Reagent for the Determination of Palladium (1-(2-piridilazo)-2-naphtol kak reaktiv dlya opredeleniya palladiya)

PERIODICAL: Vestnik Moskovskogo universiteta, Seriya
1958, Nr 4, pp 171-186 (USSR)

ABSTRACT: During the reciprecipitation of palladium chloride and 1-(2-pyridylazo)-2-naphthol there appears $C_{15}H_{11}N_3O \cdot PdCl_2$ - a combination unsoluble in water and solvable well in some organic solvents. There exists the possibility of a gravimetric detection of palladium in this combination. The 1-(2-pyridylazo)-2-naphthol is a specific and sensitive reagent, with the aid of which palladium in presence of other metals of the platinum group can be discovered photometrically well. There are 6 tables, 3 figures, and 10 references, 5 of which are Soviet, and 5 American.

ASSOCIATION: Kafedra analiticheskoy khimii (Chair of Analytic Chemistry)

SUBMITTED: Aug 22, 1957

Card 1/1

BUSEV, A.I.; BYR'KOV, V.M.

Radioactive indicator technique for determining the activity product
of cadmium diethyldithiophosphate. Trudy kom.anal.khim. 9:59-64 '58.
(MIRA 11:11)

(Activity coefficients) (Cadmium organic compounds)
(Radioactive tracers)

BUSEV, A.I.; BYR'KO, V.M.

Radiometric titrations of thallium, cadmium, and zinc by sodium
salt of 1-dithiocarboxy-5-methylpyrazoline. Trudy kom.anal.khim.
9:200-204 '58. (MIRA 11:11)
(Titration) (Metals-Analysis) (Pyrazoline)

75-2-3/26

AUTHORS: Busev, A. I., Ivanyutin, E. I.

TITLE: Dialkyl- and Diaryl-Dithiophosphoric Acids as Analytical Reagents
(Dialkil - i diarilditiofosfornyye kisloty kak analiticheskiye reaktivy)
Communication 3. Determination of Palladium With the Aid of Nickel or Potassium Dialkyl- and **Diaryl-Dithiophosphates**
(Soobshcheniye 3. Opredeleniye palladiya pri pomoshchi dialkil - i diarilditiofosfatov nikelya ili kaliya)

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1958, Vol 13, Nr 1, pp 18-20
(USSR)

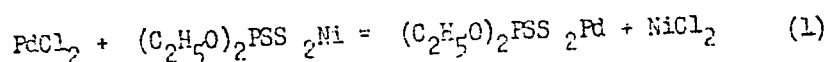
ABSTRACT: The authors' results of investigation may be summarized as follows:
1. Dialkyl and diaryl dithiophosphates quantitatively precipitate palladium from acids, neutral and alkaline solutions which contain complex-forming substances. By investigating the reaction between the palladium ion and diethyldithiophosphoric acid by different methods it was found that this reaction under different conditions always proceeds according to the equation:

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Dialkyl- and Diaryl-Dithiophosphoric Acids as Analytical
Reagents.

75-1-3/26

Communication 3. Determination of Palladium With the Aid of Nickel or
Potassium Dialkyl- and Diaryl-Dithiophosphates



2. The diethyl and the dimethyl dithiophosphate of palladium satisfies all conditions of a method of determination with regard to the form of the precipitate and weighability. A gravimetric micromethod for the determination of palladium in the presence of platinum, nickel, iron, copper and other elements was worked out. In order to obtain platinum in solution, sodium bisulfite is added. The latter reduces platinum to the bivalent stage and keeps it in the solution by the formation of a stable complex. Iron, copper and lead are kept in solution by the addition of complexone III and by being alkalized ($\text{pH} \sim 9$). This method yields sufficiently

accurate and reproducible results.

3. The rapid course of the reaction between the intensively colored iodide-complexes of palladium and nickel-diethyldithiophosphate in an acid solution at room temperature according to equation (1) is in the end point accompanied by an abrupt change of color. Based on this principle a micromethod for the titrimetric determination

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Dialkyl and ~~Diaryl~~-Dithiophosphoric Acids as Analytical Reagents. 75-1-3/26
 Communication 3. Determination of Palladium With the Aid of Nickel or
 Potassium Dialkyl- and ~~Diaryl~~-Dithiophosphates

of palladium was worked out is applicable in the presence of considerably predominant quantities of platinum and other elements. Platinum is also here masked by sodium bisulfite. This method may serve for the analysis of platinum - palladium alloys. In the presence of copper this method is not applicable.

4. The solutions of the dialkyl and diaryl dithiophosphates of palladium in chloroform, carbon tetrachloride and other organic solvents are yellow-orange and are suitable for photometric determination. The absorption maximum of the palladium diethyldithiophosphate in carbon tetrachloride is at $295\text{ m}\mu$ and almost coincides with the absorption maximum of the solutions of palladium-dimethyl, diisobutyl-, diphenyl- and dibenzyl-dithiophosphate. The value of the maximum for all dithiophosphates is in the same order of magnitude. The solutions of the palladium diethyldithiophosphate follow Beer's law at $295\text{ m}\mu$, within the limits of 0,014 mg to 0,090 mg palladium per 25 ml CCl_4 (optical densities from 0,16 to 0,90). In photometric determination the optical density is measured at $295\text{ m}\mu$. Yellow, more highly concentrated solutions of palladium diethyldithiophos=

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Dialkyl- and ~~Diaryl-~~Dithiophosphoric Acids as Analytical Reagents.

75-1-3/26

Communication 3. Determination of Palladium With the Aid of Nickel or Potassium Dialkyl- and ~~Diaryl-~~Dithiophosphates

phate can be visually colorimtered or measured in a spectrophotometer at 340 m μ . In this case the solutions follow Beer's law within the limits from 0,16 to 1,1 mg palladium per 25 ml CCl₄ (corresponding optical data from 0,15 to 0,90). The elaborated photometric methods permit the determination of palladium in the presence of platinum, nickel, copper, gold, lead, antimony and other elements with satisfactory accuracy. The diethyldithiophosphates of lead and antimony also dissolve in carbon tetrachloride and would therefore disturb the photometric determination of palladium. They can, however, be removed by washing the carbon tetrachloride layer with lye. This method especially is of great practical importance in the determination of palladium in the presence of a large excess of lead. There are 5 figures, 8 tables and 56 references, 20 of which are Slavic.

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Dialkyl- and Diaryl-Dithiophosphoric Acids as Analytical Reagents. 75-1-3/26
Communication 3. Determination of Palladium With the Aid of Nickel
or Potassium Dialkyl- and Diaryl- Dithiophosphates

ASSOCIATION: Moscow State University imeni E. V. Lomonosov
(Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova)

SUBMITTED: October 10, 1956

AVAILABLE: Library of Congress

1. Palladium - Determination
2. Dialkyl dithio-
phosphates - Chemical reactions
3. Diaryl
dithiophosphates - Chemical reactions
4. Reagents - Applications

Card 5/5

BUSEV, A.I.; IVANYUTIN, M.I.

Photometric determination of microquantities of copper in water, soil and biological materials with nickel diethyldithio-phosphate. Vest.Mosk.un.Ser.mat.,mekh.,astron.,fiz.,khim. 13 no.2:177-181 '58. (MIRA 12:2)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Thiophosphates) (Copper--Analysis) (Photometry)

75-13-2-4/27

AUTHORS: Busev, A. I., Tiptsova, V. G.

TITLE: Studies of the Analytical Chemistry of Thallium (Issledovaniya v oblasti analiticheskoy khimii talliya) Communication 1. Complexometric Determination of Thallium (Sobshcheniye 1. Kompleksometricheskoye opredeleniye talliya)

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1956, Vol. 13, Nr 2, pp. 180-185 (USSR)

ABSTRACT: A great number of methods can be found in publications for the quantitative determination of thallium (Refs 1, 2), there is, however, up to now no sufficiently specific, quick, and reliable determination method for thallium in various industrial and natural substances. In the analytical chemistry the formation of complex compounds of trivalent thallium is almost not used at all. Experiments showed that there is a great number of such compounds which are, however, only to a small extent investigated (Ref 3). Even the reaction of the trivalent thallium with complexon III is not sufficiently investigated and is therefore practically not used. Tl^{3+} forms a stable complex compound with complexon III. The methods for the determination of thallium by indirect complexo-

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75-13-2-4/27

Studies of the Analytical Chemistry of Thallium. Communication 1. Complexometric Determination of Thallium

metric titration (Refs 4, 5) described in publications which are based upon the last-mentioned fact, are complicated and not specific. In the present paper a method is worked out for the complexometric determination of thallium. For this purpose the lower limit of the pH-value for the stability of the complex compound of thallium was determined with ethylene diamine tetraacetic acid. The determination was carried out by amperometric titration by means of a rotating micro-platinum-electrode. A mercury electrode cannot be used, since mercury is dissolved in the case of a reduction potential of the Tl^{3+} -ion on the anode (Ref 9). Based upon the results of these investigation the possibility of a direct complexometric titration of the Tl^{3+} -ion at low pH-values was investigated and a suitable indicator was sought. On the strength of these experiments a direct comparatively selective method was worked out for the complexometric titration of Tl^{3+} in several technical materials. It was found that the direct amperometric titration of trivalent thallium with complexon III is possible in the case of absence of great quantities of Cl^- and Br^- ions at pH-values ≥ 1.2 and in the case of presence of considerable quantities of Cl^- at

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75-13-2-4/27

Studies of the Analytical Chemistry of Thallium. Communication 1. Complexometric Determination of Thallium

pH-values $\approx 1,4$. 1-(2-pyridylazo)-2-naphthol was found to be best suited as indicator for the Tl^{3+} -ion. This azo dye forms a red-violet colored complex in acid solutions with Tl^{3+} -ions with a 10^{-4} molar concentration or higher, which permits the visual titration of thallium with complexon III at pH ~ 2 and higher. This determination method is not disturbed by great quantities of Zn, Cd and Pb and can be used for the analysis of technical materials. Cu^{2+} , Ni^{2+} , Fe^{3+} and Bi^{3+} disturb the visual titration by formation of colored complexes with the indicator (Ref 12). Cl^- , Br^- and J^- destroy the coloration of the complex of the Tl^{3+} -ion with 1-(2-pyridylazo)-2-naphthol and disturb therefore. Colored anions disturb, too. The amperometric titration of thallium is disturbed by Fe^{3+} , Bi^{3+} and Cu^{2+} , as well as by oxidizing ions which generate a reduction current at $E = 0$ V (MnO_4^- , $Cr_2O_7^{2-}$, $S_2O_8^{2-}$ etc.). In spite of this the amperometric titration has advantages compared to the visual titration, since it permits the deter-

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Studies of the Analytical Chemistry of Thallium. Communication 1. Complexometric Determination of Thallium

mination in presence of chloride ions at pH-values of 1.4-2.0 and furthermore can be used in turbid and colored solutions. The carrying out of the two complexometric determination methods (amperometric and visual) for technical materials is described precisely. There are 2 figures, 6 tables, and 12 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 27, 1956

1. Thallium--Quantitative analysis 2. Ores--Analysis 3. Thallium
--Determination 4. Thallium--Titration

Card 4/4

AUTHORS: Busev, A. I., Ivanyutin, M. I. 75-13-3-10/27

TITLE: Dialkyl and Diaryl Dithiophosphoric Acids as Analytical Reagents (Dialkil- i diarilditiofosfornyye kisloty kak analiticheskiye reaktivy) Communication 4. Separation of Cadmium From Zinc and Other Elements. Gravimetric and Titrimetric Determination of Cadmium (Soobshcheniye 4. Otdeleniye kadmiya ot tsinka i drugikh elementov. Vesovoye i titrimetricheskoye opredeleniye kadmiya)

PERIODICAL: Zhurnal analiticheskoye khimii, 1958, Vol. 13, Nr 3, pp. 312-318 (USSR)

ABSTRACT: Diethyldithiophosphoric acid $(C_2H_5O)_2PSSH$ and its soluble salts quantitatively precipitate a number of heavy metals (Refs 1,2). The advantage as compared to dithiocarbamates and xanthogenates widely spread in analysis consists in the somewhat higher selectivity. Thus dithiophosphates do not precipitate the elements of the III-rd analytic group with the exception of Fe(III). This yields the possibility of a quantitative separation of cadmium from zinc and many other elements. Most of the determination methods for cadmium require the absence of zinc (Refs 5-9). There are very many methods (Refs 4,

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Dialkyl and Diaryl Dithiophosphoric Acids as Analytical Reagents. Communication 4. Separation of Cadmium From Zinc and Other Elements. Gravimetric and Titrimetric Determination of Cadmium. 75-13-3-10/27

10-15) for the separation of the two elements, but there is no simple, fast and exact method of separation which would be suitable for production control. In the present paper a comparatively fast gravimetric method of determination for cadmium in the presence of zinc and several other elements is worked out. The separation of cadmium is performed by precipitation with a 0,05 M solution of nickel-diethyldithiophosphate (Ref 1). Changes of the acid concentration (sulfuric or nitric acid) between 0 and 6 Mol/liter do not exert any influence upon the precipitation of cadmium. At high concentrations of nitric acid the anion of diethyldithiophosphoric acid is oxidized; in solutions more strongly acid than 6 Mol/l a decomposition of the reagent sets in. Cadmium diethyldithiophosphate is insoluble in mineral acids, but it is well soluble in organic solvents non-miscible with water which contain diluted acid, as well as in ammonia. The white precipitate consists of characteristic needles which may serve for a microcrystalloscopic proof of cadmium. Thus cadmium can still be proved in the presence of hundred-fold amounts

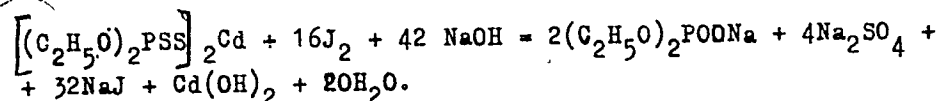
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Dialkyl and Diaryl Dithiophosphoric Acids as Analytical Reagents. Communication 4. Separation of Cadmium From Zinc and Other Elements. Gravimetric and Titrimetric Determination of Cadmium 75-13-3-10/27

of Cu, Pb and Bi at a dilution of cadmium of 1:50 000. The maximum dilution for the proof of cadmium is 1:50 000. The precipitate has the formula $[(C_2H_5O)_2PSS]_2Cd$. The melting point is 144° , the solubility in water at $18-20^\circ$ is $2.4 \cdot 10^{-4}$ Mol/l. The solubility product in water is $5.8 \cdot 10^{-11}$ (analogous to Ref 51). The precipitation of cadmium as diethyldithiophosphate is quantitatively performed from comparatively concentrated solutions with an excess of the precipitant. A saturated aqueous solution of cadmium diethyldithiophosphate serves as washing liquid. Zn, Fe(II), Al, Ga, Ni, Co, Cr, Mn, Mg, alkaline earth and alkali metals remain in the solution. Heavy metals which are precipitated by the reagent in an acid solution are disturbing. Foreign ions in any concentration do not influence the formation of the precipitate. The precipitate can be weighed out after drying, as its composition is strictly constant. But for exact determinations of small amounts of cadmium the precipitate is iodometrically titrated. The titration is based on the equation:

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Dialkyl and Diaryl Dithiophosphoric Acids as Analytical Re- 75-13-3-10/27
agents. Communication 4. Separation of Cadmium From Zinc and Other Ele-
ments. Gravimetric and Titrimetric Determination of Cadmium



The described gravimetric method can serve for the analysis of natural and technical materials and is also suitable for production control. The performance of the analysis is described. There are 1 figure, 4 tables, and 52 references, 36 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 10, 1956

1. Cadmium--Determination

Card 4/4

BUSEV, A.I.; KISILEVA, L.V.

1-(2-pyridylazo)-2-naphthol as a reagent for determining palladium.
Vest.Mosk.un.Ser.mat.,mekh.,astron.,fiz.,khim. 13 no.4:179-186 '58.
(MIRA 12:4)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Palladium--Analysis) (Naphthol)

AUTHORS: Busev, A. I., Li Gyn SOV/75-13-5-3/24

TITLE: On Chronometric Determination of Sexavalent Molybdenum With Tungsten- and Other Electrodes (K voprosu o khromometricheskom opredelenii shestivalentnogo molibdena s vol'framovym i drugimi elektrodami)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol 13, Nr 5, pp 519-527 (USSR)

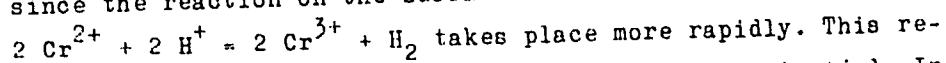
ABSTRACT: In the literature dealing with this problem one finds a number of papers which discuss the use of platinum electrodes as indicator electrodes for the potentiometric titration of sexavalent molybdenum with chromium(II) salt solutions in different media (Refs 1-14). In the case of titration in diluted hydrochloric acid the titration curves show two potential jumps. The greater one corresponds to the end point of reduction of hexavalent molybdenum to its pentavalent stage, the second and smaller jump corresponds to the end point of the reduction of molybdenum to its trivalent stage. In concentrated hydrochloric acid used as medium this second jump is bigger than the first. So far no attention has been paid to the fact that the second jump takes place at such low potentials at which the platinum

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SOV/75-13-5-3/24

On Chronometric Determination of Sexavalent Molybdenum With Tungsten- and Other Electrodes

electrode frequently has the effect of a hydrogen electrode, since the reaction on the surface of the electrode:



action leads to a decrease of the second jump in potential. In connection with this, the authors of the paper under review examined electrodes from various materials on which we find a high hydrogen overvoltage (metallic mercury, amalgamated platinum, graphite, tungsten, tantalum). It could be expected that with such electrodes one could obtain a more distinctly marked potential jump at the end point of reduction of molybdenum to its trivalent stage. In a section of experiments the reagents, the apparatus, and the technique of titration are described. Titration was carried out according to the compensating method (potentiometer P-4). Sulphuric acid and hydrochloric acid were examined as media. The result of the tests was that tungsten and graphite have certain advantages as materials for the indicator electrode which a platinum electrode does not have. This is true for the titration of hexavalent molybdenum

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SOV/75-13-5-3/24

On Chronometric Determination of Sexavalent Molybdenum With Tungsten- and Other Electrodes

in solutions both of sulfuric acid and hydrochloric acid. At the second end point of titration a distinct and sufficiently large potential jump occurs, which permits the exact determination of the end point of titration also with small amounts of molybdenum. At the end point of reduction of hexavalent molybdenum to its pentavalent stage a comparatively small but very distinct potential jump takes place in a tungsten electrode. This jump may be increased by decreasing the concentration of hydrochloric acid. The second potential jump is considerably larger than the first one and can still be increased by a higher concentration of the acid. This entire field is discussed at length in the paper. A colorimetric method for the determination of molybdenum in ferromolybdenum for which a tungsten electrode was used was developed and has yielded satisfactory results. The process of this determination is given in detail. The paper under review is one chapter of the thesis by Li Gyn (Moscow State University, 1958). There are 7 figures, 1 table, and 17 references, 8 of which are Soviet.

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SOV/75-13-5-3/24

On Chronometric Determination of Sexavalent Molybdenum With Tungsten- and
Other Electrodes

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: March 19, 1958

Card 4/4

5(2), 5(3)

AUTHORS:

Busev, A. I., Ivanyutin, M. I.

SOV/75-13-6-4/21

TITLE:

Dialkyl and Diaryl Dithiophosphoric Acids as Analytical Reagents (Dialkil- i diarilditiofosfornyye kisloty kak analiticheskiye reaktivy) Communication VII. Ammetric and Visual Titration of Lead With Nickel Diethyl Dithiophosphate in the Presence of Barium, Calcium, Zinc and Other Elements (Soobshcheniye VII. Amperometriceskoye i vizual'noye titrovaniye svintsa pri pomoshchi dietilditiofosfata nikelya v prisutstvii bariya, kal'tsiya, tsinka i drugikh elementov)

PERIODICAL:

Zhurnal analiticheskoy khimii, 1958, Vol 13, Nr 6, pp 647-652 (USSR)

ABSTRACT:

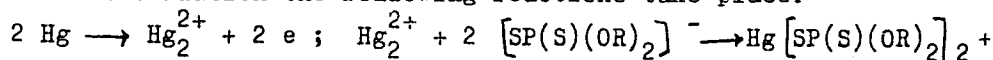
The anions of the dialkyl and diaryl-dithiophosphoric acids are not reduced on a dropping-mercury cathode and on a rotary platinum microcathode. It is therefore possible to determine by ammetric titration on the basis of the cathode current only those ions that are reduced on the electrodes mentioned. It was, however, proved that the anions of the diaryl-dithiophosphoric acids are oxidized on a dropping-mercury anode and on a rotary platinum microanode (Ref 1). Between the current intensity and the concentration of dialkyl-

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Dialkyl and Diaryl Dithiophosphoric Acids as
Analytical Reagents. Communication VII. Ammetric
and Visual Titration of Lead With Nickel Diethyl
Dithiophosphate in the Presence of Barium, Calcium,
Zinc and Other Elements

SOV/75-13-6-4/21

dithiophosphate (< 1 mmol per l) there is a rectilinear
proportionality on oxidation on a dropping-mercury anode.
On this oxidation the following reactions take place:



+ Hg. The mercury electrode does thus not behave as an
indifferent electrode. The half-wave potential in the
oxidation of dialkyl-dithiophosphates on a dropping mercury
anode becomes more negative with increasing molecular weight
of the radical which is probably related with a decreasing
solubility of the corresponding dialkyl-dithiophosphates of
mercury. On a platinum microanode the following reaction
takes place: $2 [\text{SP}(\text{S})(\text{OR})_2]^- \rightarrow (\text{RO})_2\text{P}(\text{S})\text{SS}(\text{S})\text{P}(\text{OR})_2 + 2 \text{e}^-$.

In the present paper an ammetric method of the titration of
lead with a solution of nickel diethyl-dithiophosphate in the
presence of the alkaline-earth metals and many other elements

Card 2/4

Dialkyl and Diaryl Dithiophosphoric Acids as.
Analytical Reagents. Communication VII. Ammetric
and Visual Titration of Lead With Nickel Diethyl
Dithiophosphate in the Presence of Barium, Calcium,
Zinc and Other Elements

SOV/75-13-6-4/21

is devised. A rotary platinum microanode at a potential of +0.8 V is employed accordingly. In this connection the composition of lead diethyl-dithiophosphate was investigated. It corresponds to the formula $[(C_2H_5O)_2PSS]_2Pb$ which is in accordance with publications (Refs 4-6). For the solubility of the precipitation in water at 22-24° a value of $1.3 \cdot 10^{-4}$ mol/l was found (solubility product $Sp = 8.6 \cdot 10^{-12}$). The applicability of ammetric titration of lead according to this method in the presence of alkaline-earth metals is very important, because the separation of these elements from lead is very difficult. The titration is carried out in 0,1-1 n nitric acid solution. Furthermore, a visual method of the titration of lead with nickel diethyl-dithiophosphate was devised. During the titration the solution above the precipitate is turbid and becomes clear only by shaking. The final point can easily be determined by the fact that the first excess drop of the reagent does no longer cause any turbidity. The

Card 3/4

Separation of Gallium and Indium by the Diethyl- 77748
dithiocarbamate Method SOV/75-15-1-10/29

1 French, 1 Czechoslovak, 7 Soviet. The 5 most recent U.S. and U.K. references are: Irving, H. M., Rossoti, F. G. C., Analyst 77, 801 (1952); Kraus, K. A., Nelson, F., Smith, G. W., J. Phys. Chem. 58, N 1, 11 (1954); Arden, T. W., Burstall, F. H., Davies, G. R., Lewis, J. A., Linstead, P. G., Nature 162, 691 (1948); Carvalho, R. G. de, Lederer, M., Analyt. chim. acta 15, Nr 6, 543 (1956).

ASSOCIATION: M. V. Lomonosov Moscow State University (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova)

SUBMITTED: November 11, 1958

Card 5/5

BUSEV, A.I., LI GYN

Problem involving the chromometric determination of molybdenum in the presence of thiocyanates. Vest. Mosk. un. Ser. 2: khim. 15 no.2:73-75 Mr-Ap '60. (MIRA 13:6)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Molybdenum--Analysis)

BUSEV, A.I., BYR'KO, V.M., GRANDBERG, I.I.

Photometric determination of molybdenum in the presence of tungsten with the aid of sodium 5-phenylpyrazoline-1-dithiocarbamate. Vest. Mosk. un. Ser. 2: khim. 15 no.2:76-80.Mr-Ap '60.

(MIRA 13:6)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Molybdenum--Analysis)

BUSEV, A.I.; LI GYN

Molybdenometry. Report No.2: Titration of hexavalent molybdenum by means of a solution of a trivalent molybdenum salt. Zhur.anal. khim. 15 no.2:191-199 Mr-Ap '60. (MIRA 13:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Molybdenum--Analysis)

S/189/60/000/003/010/013/XX
B003/B067

AUTHORS: Busev, A. I., Byr'ko, V. M.

TITLE: Exchange Reactions of Pyrazoline Dithiocarbaminates and
Their Use for Radiometric Determinations in Analogy With
Diethyl Dithiocarbamate ⁹

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960, Vol 15
No. 3, pp. 46-50

TEXT: The authors studied the metal ion exchange reactions of the
pyrazoline dithiocarbaminates for the purpose of finding new possibilities
for using these compounds in analyses. From among the compounds of the
general formula $\begin{array}{c} R \\ \diagup \\ N \\ \diagdown \\ C \\ \diagup \\ S \\ \diagdown \\ R' \end{array}$ mainly sodium 3-methyl-5-phenylpyrazoline-1-

dithiocarbamate was used. The other compounds used (R'' - furyl R' , R'' ,
 R - CH_3 , R' , R'' - C_6H_5 a.o.) react completely analogously. The exchange
reactions took place between aqueous solutions of the metal salts and

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Exchange Reactions of Pyrazoline Dithio-
carbamates and Their Use for Radiometric
Determinations in Analogy With Diethyl
Dithiocarbamate

S/189/60/000/003/010/013/XX
B003/B067

organic dithiocarbamate solutions, immixible with water, according to
the following equation $m[Me_2^{n+}]H_2O + n[Me_1R]_{org} \rightleftharpoons n[Me_1^{m+}]H_2O + m[Me_2R_n]_{org}$

(R = dithiocarbamate anion, m and n = stoichiometric coefficients,
Me = metal ion). The aqueous phase contained Na-tartrate as masking agent.
Chloroform was used as organic solvent. Radioactive ions were interchanged
with nonactive metal ions. The salts of pyrazoline dithiocarbamic acids
were obtained by introducing the Na-salt of these acids into the aqueous
solutions of the metal salts and by subsequent extraction with chloroform.
The reaction intensity was determined radiometrically. CBT-8 (SBT-8)
and AC-2 (AS-2) beta counters as well as AMM-4 (AMM-4) gamma counters
served as measuring instruments. Fig. 1 shows the dependence of the
intensity on the duration of shaking, after the two phases had been brought
in contact (organic phase - InR_3 , aqueous phase Zn^{2+} -solution, pH - 8.5).

The exchange equilibrium occurs already after three minutes. Fig. 2 shows
the dependence of the reaction intensity on the pH of the aqueous phase

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Exchange Reactions of Pyrazoline Dithio-
carbaminates and Their Use for Radiometric
Determinations in Analogy With Diethyl
Dithiocarbamate

S/189/60/000/003/010/013/XX
B003/B067

(organic phase - InR_3 , aqueous phase Zn^{2+} -solution, and organic phase - TlR_3 , aqueous phase Cu^{2+} solution). The optimum pH value was 8.5. Table 1 gives a survey of the reciprocal displacement of the different metals from their compounds with pyrazoline dithiocarbamic acid. The displacement takes place in the following order: Tl^{3+} , Cu^{2+} , Bi^{3+} , Pb^{2+} , In^{3+} (with the preceding metal displacing the following one). The determinations were made by measuring the change of radioactivity in one of the two phases. If the exchange proceeds completely and at stoichiometric ratios (Fig. 3) the calibration curve may be replaced by a calculation from formula $A_1 = (A_2 m M_2 / n M_1) [1 - (J_2 - \bar{J}) / (J_1 - \bar{J})]$ (A_1 amount in grams of the element Me_1 to be determined, A_2 amount of Me_2 contained in the initial solution, M_1 and M_2 atomic weights of the metals, m and n stoichiometric coefficients, J_1 radioactivity of the initial solution of Me_2 before shaking, J_2 activity of the Me_2 solution after shaking, \bar{J} background level). The

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Exchange Reactions of Pyrazoline Dithio-
carbaminates and Their Use for Radiometric
Determinations in Analogy With Diethyl
Dithiocarbamate

S/189/60/000/003/010/013/XX
B003/B067

following examples of analyses are given: determination of Tl and Al by displacing radioactive In from its pyrazoline dithiocarbamate compounds, determination of In by displacement with Zn^{65} (Fig. 3, Table 2). Among others, a paper by S. Ye. Kreymer and L. P. Butylkin is mentioned. The present paper was a contribution to the first Vsesoyuznaya konferentsiya vuzov po radiokhimii (First All-Union Conference of the Universities on Radiochemistry) on April 21, 1959, section "Primeneniye radioaktivnykh izotopov v khimii" (Application of Radioactive Isotopes in Chemistry), There are 3 figures, 3 tables, and 4 references: 2 Soviet, 1 CSR, and 1 German.

ASSOCIATION: Moskovskiy universitet, Kafedra analiticheskoy khimii
(Moscow University, Chair of Analytical Chemistry)

SUBMITTED: May 28, 1959

Card 4/4

S/189/60/000/003/011/013/XX
B003/B067

AUTHORS: Busev, A. I., Ivanov, V. M.

TITLE: Pyridyl-(2-azo-4)-resorcin as Reagent for the Photometric Determination of Uranium

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960, *vol 15*
No. 3, pp. 52-60

TEXT: The present paper gives a detailed study of the applicability of pyridyl-(2-azo-4)-resorcin (PAR) for the photometric determination of uranium. The experiments were made with an aqueous uranyl nitrate solution (concentration 10^{-4} mole/l) as well as with exactly adjusted aqueous PAR solutions. PAR was synthesized by the method of A. Ye. Chichibabin (Ref. 2). On pouring together the two solutions (at pH 7-8) the mixture turns into an intense raspberry red. The measurements were made with an CF-4 (SF-4) spectrophotometer as well as with an ФЭВ-Н-52 (FEK-N-52) photoelectric colorimeter. The investigations showed that PAR is one of the most sensitive reagents to UO_2^{2+} (0.02 μ /ml still cause strong coloring). The absorption maximum of the PAR uranyl complex is at 510 m μ . The

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Pyridyl-(2-azo-4)-resorcin as Reagent for
the Photometric Determination of Uranium

S/189/60/000/003/011/013/XX
B003/B067

effect of the pH value on the absorption at 510 m μ was determined by adjusting the pH with ammonia and nitric acid and by means of buffer mixtures. No complex is formed in the pH region of 0.65-2.72. The highest extinction values were attained at pH 7.5-7.6. The coloring is stable for approximately 30 minutes. The necessary minimum concentration of uranium for their formation is $4 \cdot 10^{-6}$ mole/l. The composition of the PAR uranyl complex was studied by the method of Ostromyslenskiy - Job (successfully) and by two further methods (without success). PAR and uranium are contained in the complex at a molar ratio 1:1. The solutions of the complex obey the Lambert-Beer law in the concentration region between 0.08-16 μ /ml uranium. The extractability of the complex with organic solvents was studied at different pH values of the aqueous phase. The best results were obtained with isoamyl alcohol and at pH 7.53 (borate buffer). The presence of Li, Na, K, Mg, Ca, Sr, Ba, Be, Ti, Nb, Ta, Sn, Mo, Wo, Ce, Ir, Rh, As, Se has no effect on the photometric determination of uranium in its complex with PAR. Under experimental conditions Cu, Cr, Pb, Bi, Hg, Sb, Fe, La are precipitated. Co, Ni, Mn, Zr, Zn, Th form complexes. The authors determined the uranium content of a uranium mineral by means of PAR. Finally instructions are given for the photometric determination of

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Pyridyl-(2-azo-4)-resorcin as Reagent for
the Photometric Determination of Uranium

S/189/60/000/003/011/013/XX
B003/B067

uranium by means of PAR. Papers by A. Ye. Chichibabin, M. D. Ryazantsev,
N. A. Kanayev are mentioned. There are 9 figures, 6 tables, and 10
references: 6 Soviet, 2 German, 1 US, and 1 British.

ASSOCIATION: Moskovskiy universitet, Kafedra analiticheskoy khimii
(Moscow University, Chair of Analytical Chemistry)

SUBMITTED: June 23, 1959

✓

Card 3/3

BUSEV, A.I.; TIPTSOVA, V.G.

Studies in the analytical chemistry of thallium. Report
No.4: Diantiprylpropylmethane as a reagent for the quantitative
determination of thallium. Zhur.anal.khim. 15 no.3:291-294
My-Je '60. (MIRA 13:7)

1. M.V.Lomonosov Moscow State University.
(Thallium—Analysis) (Methane)

S/075/60/015/004/016/030/XX
B020/B064

AUTHORS: Busev, A. I. and Chzhan Fan'

TITLE: Compounds of Pentavalent Molybdenum With 8-Hydroxyquinoline⁷
and Their Use in Analytical Chemistry

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 4,
pp. 455 - 462

TEXT: Even though pentavalent and hexavalent molybdenum form compounds with 8-hydroxyquinoline, it has so far not been possible to isolate the first in a pure form, and to determine their composition. The aim of the present work was a systematic investigation of the reaction of pentavalent molybdenum with 8-hydroxyquinoline and of its applicability in analytical chemistry. The preparation and analysis of the compounds of pentavalent molybdenum with 8-hydroxyquinoline were studied. Furthermore, the precipitation of pentavalent molybdenum in weakly acid solutions was investigated. The results of analysis show (Table 1) that the composition of the black precipitate obtained at boiling temperature is very accurately described by the formula $\text{Mo}_2\text{O}_3(\text{C}_6\text{H}_9\text{ON})_4 \cdot \text{H}_2\text{O}$, while the greenish precipitate

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Compounds of Pentavalent Molybdenum With S/075/60/015/004/016/030/XX
8-Hydroxyquinoline and Their Use in Analytical B020/B064
Chemistry

formed at room temperature is of entirely different composition, i.e., $H_2Mo_4O_{11} \cdot (C_9H_7ON)_7 \cdot 11H_2O$. The structural formula of the black molybdenum compound reads $(C_9H_6NO)_2=MoO-O-MoO=(C_9H_6NO)_2 \cdot H_2O$. The formation of two compounds of different colors is clearly related to the amphoteric character of 8-hydroxyquinoline and the possible existence of pentavalent molybdenum in aqueous solutions in the form of various anions and oxygen-containing cations. Pentavalent molybdenum, together with various substituted 8-hydroxyquinolines, forms colored precipitates or soluble compounds, e.g., together with 5,7-dibromo-8-hydroxyquinoline an orange precipitate at pH 2 - 3, decomposing after the addition of excessive lye, and together with 7-iodo-8-hydroxyquinoline-5-disulfonic acid (Ferron) at $pH \approx 2$, an intense yellowish-orange coloring. 8,8'-dioxy-5,5'-diquinol methane hydrochloride yields, together with pentavalent molybdenum, an orange-red precipitate at pH 2 - 3. "Thermogravigrams" are given for the compounds of pentavalent molybdenum with 8-hydroxyquinoline (Fig. 1), and the solubility of these compounds in various organic solvents is given in Table 2. Fig. 3 shows the absorption curves of these compounds in $CHCl_3$. ✓

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Compounds of Pentavalent Molybdenum With S/075/60/015/004/016/030/XX
8-Hydroxyquinoline and Their Use in Analytical B020/B064
Chemistry

It is shown that the black compound of pentavalent molybdenum with 8-hydroxyquinoline can be used for the photometric determination of small amounts of molybdenum (some tenth γ Mo/ml) in 50% acetone. Fig. 3 reveals the influence of the quantity of 8-hydroxyquinoline upon the optical density of the solutions. Fig. 5 illustrates the effect of hydrazine hydrochloride upon the optical density of $\text{Mo}_2\text{O}_3(\text{C}_9\text{H}_6\text{NO})_4 \cdot \text{H}_2\text{O}$ solutions, whereas Fig. 4 indicates that the solutions obey the Beer law. Fig. 6 shows the time of heating in the reduction of hexavalent molybdenum at different HCl concentrations. Table 3 indicates that the color intensity of solutions in acetone decreases only slowly and are practically stable for three hours. From Table 4 it may be seen that Ca and Mg do not interfere even at high concentrations, nor do small quantities of Cd, Ni, Zn, and Fe (less than 0.1 mg), and Cr^{III} (2 mg). Large quantities of Cr, Mn, Cu, Ce, Ti, and tungsten disturb just as complexon III, which thus cannot be used to mask interfering elements. There are 6 figures, 4 tables, and 15 references: 1 Soviet, 1 French, 2 British, 1 Swiss, 2 Dutch, 1 Czech, 1 Polish, and 5 German. ✓

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Compounds of Pentavalent Molybdenum With S/075/60/015/004/016/030/XX
8-Hydroxyquinoline and Their Use in Analytical B020/B064
Chemistry

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova ✓
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 27, 1959

Card 4/4

S/075/60/015/005/013/026/XX
B002/B056

AUTHORS: Busev, A. I. and Tiptsova, V. G.

TITLE: Investigations in the Field of Analytical Chemistry of
Thallium. Communication 5. Investigation of the Complexo-
metric Indicators for Trivalent Thallium

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 5,
pp. 573 - 580.

TEXT: It was the aim of the authors to find out to what extent three
new complexometric indicators for the determination of thallium may be
used at low pH-values. The following investigations were made:
1-(2-pyridyl-azo)-2-naphthol, synthesized according to A. Ye. Chichi-
babin; 1-(2-pyridyl-azo)-resorcinol, synthesized according to Chichi-
babin, and xylenol orange. For the purpose of measuring the absorption
spectra, a CF-4 (SF-4) spectrophotometer was used. For the complex of
thallium with 1-(2-pyridyl-azo)-2-naphthol the following was found:
absorption maximum 560 mμ, molar extinction coefficient $2.17 \cdot 10^4$, equi-
librium constant $1.93 \cdot 10^2$, measured at pH 2.2. In this region, however,

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Investigations in the Field of Analytical Chemistry of Thallium. Communication 5. Investigation of the Complexometric Indicators for Trivalent Thallium S/075/60/015/005/013/026/XX B002/B056

chlorine- and bromine ions considerably interfere with the measurements. The influence exerted by halide-ions becomes low only at pH 4-5, where, however, the selectivity of the indicator is also very low. Besides, the solubility of the complex in water is limited. The complex may therefore practically not be used for the photometrical determination of thallium. For the complex of thallium with 1-(2-pyridyl-azo)-resorcinol the following was found: absorption maximum 520 mμ, molar extinction coefficient $1.805 \cdot 10^4$, equilibrium constant $1.70 \cdot 10^4$, measured at pH 2.2. For concentrations of between 1 and 10 μg Tl per ml, the Beer law holds. For the complex of thallium with xlenol orange the following was found: absorption maximum 580 mμ, molar extinction coefficient $1.96 \cdot 10^4$, equilibrium constant $8.00 \cdot 10^4$, measured at pH 1.4. For the titration of a 0.01 M thallium solution, the indicators may be used from the following pH values upwards (in brackets the theoretical error of titration): 1-(2-pyridyl-azo)-2-naphthol from pH 1.88 (-0.45%),

Card 2/3

Investigations in the Field of Analytical Chemistry of Thallium. Communication 5. Investigation of the Complexometric Indicators for Trivalent Thallium S/075/60/015/005/013/026/XX B002/B056

1-(2-pyridyl-azo)-resorcinol from pH 1.7 (+0.68%), xlenol orange from pH 2.0 (+1.88%). N. P. Komar' and V. N. Tolmachev are mentioned. There are 9 figures, 3 tables, and 9 references: 8 Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova
(Moscow State University imeni M.V. Lomonosov)

SUBMITTED: June 29, 1959

Card 3/3

87136

5.5200

1273, 1282 only

S/075/60/015/006/009/018
B020/B066

AUTHORS: Busev, A. I. and Tiptsova, V. G.

TITLE: Separation and Determination of Gallium by Means of Di-
antipyril-propyl Methane

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 6,
pp. 698-700

TEXT: The objective of the present paper was a systematic investigation of the applicability of gallium precipitation with diantipyril-propyl methane for separation and quantitative determination. The reagent mentioned was earlier (Ref. 2) used for the gravimetric determination of thallium in the presence of Zn, Cd, Cu, In, Al, and others, in which connection the presence of gallium did not disturb. The precipitation of Ga with diantipyril-propyl methane starts from a solution in 3 M HCl, and its quantitative precipitation takes place from 5.5 - 6 M HCl. Diantipyril methane and diantipyril-methyl methane do not precipitate Ga quantitatively from hydrochloric acid solutions. The gallium complex of diantipyril-propyl methane has the composition $C_{26}H_{30}O_2N_4 \cdot HGaCl_4$. The accuracy of analytical results is fully satisfactory (Table 1); besides, the method

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Separation and Determination of Gallium
by Means of Diantipyril-propyl Methane

S/075/60/015/006/009/018
B020/B066

is simple and does not take much time, since the precipitate is easily filtrable. The method is highly selective, since the gallium determination is not disturbed by many elements such as Zn, Cd, Cu, Al, Ni, Mn, Mg, In, Co, Bi, and others (Table 2). Tl^{3+} and Fe^{3+} do interfere. The method can be used for separating gallium from its accompanying elements. Fe^{3+} must be reduced to Fe^{2+} . After separating gallium by complexing with diantipyril-propyl methane, the determination can be carried out by the complexometric method: the precipitate is filtered, re-washed, and then rinsed from the filter with water. A few ml of a 5% solution of tartaric acid and ammonium acetate are added to the solution up to a pH of about 5. After heating up to 70-80°C in the presence of 1-(2-pyridilazo)-2-naphthol, it is titrated until the color changes from pink to yellow. The results were completely satisfactory (Table 3). There are 3 tables and 2 references: 1 Soviet and 1 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: August 20, 1959

Card 2/2

S/074/60/029/008/004/005/XX
B023/B070

AUTHORS: Busev, A. I. and Tiptsova, V. G.

TITLE: Analytical Chemistry of Thallium 1

PERIODICAL: Uspekhi khimii, 1960. Vol. 29, No. 8, pp. 1011 - 1028

TEXT: The present paper systematizes the data on analytical reactions of mono- and trivalent thallium published in the last few years. The contents are as follows: 1. Classification of methods for estimation of thallium. The most reliable methods are considered to be the gravitational methods which depend on the precipitation of thallium as chromate, iodide, thionalidate, mercaptobenzothiazolate, oxyquinolate, hexamine cobaltihexachloro thallate, tetraphenyl arsonium tetrachloro thallate, or diantipyryl methane tetrabromo thallate. Titrimetric methods are of much more practical importance. Other methods in use are: electrochemical, coulometric, polarographic, spectral photometric, and spectral methods. Traces of thallium are determined by activation methods. Methods of separating thallium from the accompanying elements and methods of concentration are dealt with in Refs. 29-40a. 2. Analytical reactions of monovalent thallium. Those ions

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Analytical Chemistry of Thallium

S/074/60/029/008/004/005/XX
B023/B070

and molecules which tend to form a covalent binding may serve as reagents of Tl^+ , as, for example, mercaptobenzothiazole, thionalide, dithizone, thiourea, and Reinecke's salt. A. Reaction of precipitation of monovalent thallium ion. Precipitation in the form of chromate, bichromate, iodide, reineckate, iodate, cobalt nitrate, and ferrocyanides. The last topic was treated by I. V. Tananayev and M. N. Glushkova (Ref. 79). Precipitation as sulfide. Precipitation with inorganic ions. Precipitation of thallium by organic reagents. B. Reaction of the oxidation of monovalent thallium (Refs. 110-137). C. Reactions of reduction of monovalent thallium to metal. Reduction on dropping mercury electrode (polarographic methods). Reduction on other cathodes (electrolytic methods). D. Reactions of formation of complexes by monovalent thallium (Refs. 157-178). 3. Analytical reactions of trivalent thallium ion (Ref. 179). A. Reactions of formation of complexes of trivalent thallium. Hydrocomplexes, nitrate complexes, sulfate, cyanide-, halide-, acetate-, tartrate complexes; complexes with some amines; complex with ethylene diamine tetraacetic acid; complex compounds with 8-oxyquinoline and its derivatives; complex compounds with various dithiocarbamates; and some other complexes of thallium with organic reagents. B. Reaction of reduction of trivalent thallium

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Analytical Chemistry of Thallium

S/074/60/029/008/004/005/X
B023/B070

(Refs. 270-280). It is recommended that new methods of study and application of thallium be developed for the complex compounds of tri-valent thallium. These must be simple, rapid, and accurate, and must eliminate the shortcomings of the methods available at present. K. B. Yatsimirskiy and N. I. Bashilova (Refs. 56, 57) are mentioned. There are 280 references: 96 Soviet.

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Dialkyl- and diaryldithiophosphoric acids as analytical reagents.
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acids with ions of elements. Trudy kom. anal. khim. 11:172-191
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1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Phosphorodithioic acid) (Chemical tests and reagents)